KYAE Content Standards Work Groups [English (Writing), Reading, and Mathematics]

R/W	ADP Benchmark or Adapted Benchmark/Source	Anchor	Essential	Gateway	Other Benchmark	EXAMPLE
W	A1. Demonstrate control of standard English (EAE) through the use of grammar, punctuation, capitalization, and spelling.	X Marginal	X Adequate	X Effective	GED Essay Scoring Guide	See "What Do the GED Tests Measure?" pp. 24-25
RW	A2. Use general dictionaries, thesauruses, and glossaries (print and electronic) to determine definition, pronunciation, spelling, and usage of words.	X	X	X		Self-explanatory. This is a progressively developed skill based on reading level.
R	A3. Use roots, affixes, and cognates to determine the meaning of unfamiliar words.	X	X	X		**Anchor**: "-ology" as "the study of" **Essential**: "micro-" as in "micromanage" **Gateway**: "meta-" as in "meta-cognition"
R	A4. Use context to determine the meaning of unfamiliar words.	X	X	X		Self-explanatory. This is a progressively developed skill based on reading level.
R	A5. Identify the meaning of common idioms, as well as literary, classical, and biblical allusions; use them in oral and written communication.	X Common idioms	X Literary & biblical	X All		**Anchor:** "It's raining cats and dogs."; Symbol of serpent from Garden of Eden **Essential:** Ulysses; Herculean task; Lot's wife; Job **Gateway:** The Hemingway hero
RW	A6. Recognize nuances in the meanings of words; choose words to enhance communication.		X	X		Self-explanatory. This is a progressively developed skill based on reading level.
C	B7. Participate productively in self-directed work teams for a particular purpose. (See bullets in ADP doc.)	X	X	X		Self-explanatory. This is a progressively developed skill based on reading level. (See ADP p. 32)
W	C1. Plan writing by taking notes, writing informal outlines, and researching.	X	X	X		Self-explanatory. This is a progressively developed skill based on reading level.

KYAE Content Standards Work Groups [English (Writing), Reading, and Mathematics]

R/W	ADP Benchmark or Adapted Benchmark/Source	Anchor	Essential	Gateway	Other Benchmark	EXAMPLE
W	C2. Select and use formal, informal, literary, or technical language appropriate for the purpose, audience, and context of the communication.	X Informal	X Technical	X Formal and literary		**Anchor:** Use informal language in writing **Essential:** Use technical language in writing **Gateway:** Use formal and literary language in writing
W	C3. Organize ideas in writing with a thesis statement in the introduction, well-constructed paragraphs, a conclusion, and transition sentences that connect paragraphs into a coherent whole.	X Personal narrative	X Argument/ Analysis	X Synthesis/ Evaluation		See "What Do the GED Tests Measure?" pp. 24-25
W	C4. Drawing on readers' comments on working drafts, revise documents to develop or support ideas more clearly, address potential objections, ensure effective transition between paragraphs, and correct errors in logic.	X Respond to specific comments for revision	X Define specifics from generalized comments	X		See "What Do the GED Tests Measure?" pp. 24-25
W	C5. Edit for grammar, tone, and style appropriate to audience, purpose, and context.	X Grammar	X Tone	X Style		See "What Do the GED Tests Measure?" p. 21
W	C6. Cite print or electronic sources properly when paraphrasing or summarizing information, quoting, or using graphics.	X Very informally	X Informally in text	X Formally		Self-explanatory. This is a progressively developed skill based on reading level.
W	C9. Write an analysis (for example, an explanation, a critique, an argument, or a literary analysis) that: • Develops a main idea. • Creates an organizing structure appropriate to purpose, audience, and		X Analytic report	X Analytic essay		**Essential:** Write an analytical report **Gateway:** Write an analytical essay

KYAE Content Standards Work Groups [English (Writing), Reading, and Mathematics]

R/W	ADP Benchmark or Adapted Benchmark/Source	Anchor	Essential	Gateway	Other Benchmark	EXAMPLE
	context. • Includes relevant information and excludes extraneous information. • Makes valid inferences. • Supports judgments with relevant and substantial evidence and well-chosen details. • Provides a coherent conclusion.					
W	D1. Define and narrow a problem or research topic.	X Define a problem (subjective response)	X Define and narrow a problem (objective response)	X Research topic		**Anchor:** Define a problem with a subjective response **Essential:** Define a problem with an objective response **Gateway:** Define a research topic
W	D2. Gather relevant information from a variety of print and electronic sources, as well as from direct observation, interviews, and surveys.	X Gather information from informal or news sources	X	X		**Anchor**: Local newspapers **Essential**: National published sources such as *Newsweek* **Gateway**: Published academic sources such as *JAMA*
RW	D3. Make distinctions about the credibility, reliability, consistency, strengths, and limitations of resources, including information gathered from Web sites.		X Credibility and strengths	X		Self-explanatory. This is a progressively developed skill based on level.
W	D4. Report findings within prescribed time and/or length requirements, as appropriate.	X	X	X		Self-explanatory. This is a progressively developed skill based on level.

KYAE Content Standards Work Groups [English (Writing), Reading, and Mathematics]

R/W	ADP Benchmark or Adapted Benchmark/Source	Anchor	Essential	Gateway	Other Benchmark	EXAMPLE
R	E1. Distinguish among facts, opinions, evidence, and inferences.	X	X	X		Self-explanatory. This is a progressively developed skill based on reading level.
R	E5. and E6. Recognize common logical fallacies.	X	X	X		Self-explanatory. This is a progressively developed skill based on reading level.
C	E9. Construct arguments (both orally and in writing) that provide clear and effective conclusions.	X Oral	X In writing	X In writing		Self-explanatory. This is a progressively developed skill based on level.
R	F1. Follow instructions in informational or technical texts to perform specific tasks, answer questions, and/or solve problems.	X	X	X		**Anchor**: Perform specific tasks **Essential**: Answer questions, and/or solve problems **Gateway**: Answer questions, and/or solve problems
R	F2. Identify the main ideas of informational text and determine the essential elements that elaborate them.	X	X	X		Self-explanatory. This is a progressively developed skill based on reading level.
W	F3. Summarize informational and technical texts and explain the visual components that support them.	X	X	X		**Anchor**: Informational text **Essential**: Technical text **Gateway**: Academic text
R	F4. Distinguish between a summary and a critique.		X	X		Self-explanatory. This is a progressively developed skill based on reading level.
RWC	F5. Interpret and use information in maps, charts, graphs, time lines, tables, and diagrams.	X	X	X		Self-explanatory. This is a progressively developed skill based on reading level.
R	F6. Identify interrelationships between and among ideas and concepts within a text, such as cause-and-effect relationships.	X	X	X		**Anchor**: Informational text **Essential**: Technical text **Gateway**: Academic text This is a progressively developed skill based on reading level.
WC	F7. Organize information from multiple informational and technical sources.		X	X		Self-explanatory. This is a progressively developed skill based on reading level.

KYAE Content Standards Work Groups [English (Writing), Reading, and Mathematics]

R/W	ADP Benchmark or Adapted Benchmark/Source	Anchor	Essential	Gateway	Other Benchmark	EXAMPLE
R	F8. Draw conclusions based on evidence from informational and technical texts.	X General	X Informational and technical	X Informational and technical		Self-explanatory. This is a progressively developed skill based on reading level.
R	F10. Recognize the use of ambiguity, contradiction, paradox, irony, incongruities, overstatement, and understatement in texts.	X Recognize	X Define	X		Self-explanatory. This is a progressively developed skill based on reading level.
R	F11. Evaluate informational and technical texts for their clarity, simplicity, and coherence and for the appropriateness of their graphics and visual appeal.			X		Self-explanatory.
R	H1. Demonstrate knowledge of foundational works of literature.			X		For example: *The Declaration of Independence*, Ralph Waldo Emerson, William Faulkner, Eugene O'Neill, Robert Frost, Harriet Jacobs, Selections from Chaucer's *Canterbury Tales*, Dante and John Milton, William Shakespeare, George Herbert, William Blake, Robert Browning, W.H. Auden, George Bernard Shaw, George Orwell, Voltaire, *The Vicar of Wakefield* by Oliver Goldsmith, Lord Byron, Jane Austen, Virginia Woolf (ADP pp. 45-46 and 50-51)
RW	H4. Analyze works of literature, such as short stories and novels.			X		For example: Thomas Mann, Ted Hughes, Winston Churchill, Jean Cocteau, The Koran (ADP pp. 38-51) For example: *The Great Gatsby* by F. Scott Fitzgerald, *The Red Badge of Courage* by Stephen Crane, *The War of the Worlds* by H.G. Wells, *The Iliad* by

KYAE Content Standards Work Groups [English (Writing), Reading, and Mathematics]

R/W	ADP Benchmark or Adapted Benchmark/Source	Anchor	Essential	Gateway	Other Benchmark	EXAMPLE
						Homer, "O Captain! My Captain!" by Walt Whitman, "Gift of the Magi" by O. Henry, "Oedipus Rex" by Sophocles, "House Divided" by Abraham Lincoln, *Roots*, by Alex Haley, *The Story of My Life* by Helen Keller
R	H7. Read works of literature for information about the historical period in which they were written.	X	X	X		For example: *A Tale of Two Cities* by Charles Dickens, *Black Like Me* by John Howard Griffin, *Compton's Encyclopedia* (ADP pp. 38-51)
RW	H8. Identify the moral dilemmas in works of literature.	X	X	X		For example: *Catcher in the Rye* by J.D. Salinger, "Death of a Salesman" by Arthur Miller, "Sharing the American Dream" by Colin Powell
RW	H9. Identify and explain the themes found in a single literary work; analyze the ways in which similar themes and ideas are developed in more than one literary work.			X		For example: *Frankenstein* by Mary Shelley, *To Kill a Mockingbird* by Harper Lee, *Cry, the Beloved Country* by Alan Paton, *The Grapes of Wrath* by John Steinbeck, "The Glass Menagerie" by Tennessee Williams, "A Raisin in the Sun" by Lorraine Hansberry

KYAE Content Standards Work Groups [English (Writing), Reading, and Mathematics]

R/W	ADP Benchmark or Adapted Benchmark/Source	Anchor	Essential	Gateway	Other Benchmark	EXAMPLE

Mathematics Benchmarks

I. Number Sense & Numerical Operations					
I1. Compute without a calculator:				Adapted	
I1.1 Add, subtract, multiply and divide integers, fractions and decimals.	X	X	X		**Anchor:** $3\frac{3}{4} \div 1.2 = 15/4 \div 6/5 = 15/4 \times 5/6$ $= 75/24 = 25/8 = 3\frac{1}{8} = 3.125$. **Anchor:** Estimate the total of a column of 10 to 15 numbers (typically, dollars and cents) and then add them manually (e.g., by grouping 10s).
I1.2 Calculate and apply ratios, proportions, rates and percentages to solve problems.	X	X	X		**Anchor:** In the last four quarters, the returns reported for your mutual fund were, in succession, +2.33%, -1.75%, +3.02%, -2.54%. What was your return for the year?
I1.3 Use the correct order of operations to evaluate arithmetic expressions, including those containing parentheses.	X	X	X		**Anchor:** $(3 - 1)^3 + [1.6 / (-4)]$ **Essential:** $[18 - (4 - 7)^3]/(-5)(2)$ **Gateway:** $[8 - \sqrt{36} - 4^3]/[2^4 - (-12)(4-5)]$
I1.4 Explain and apply basic number theory concepts such as prime number, factor, divisibility, least common multiple and greatest common divisor.	X	X	X		**Anchor:** Use prime factorization to find the GCF and LCM of 6 and 10 **Essential:** Use prime factorization to find the GCF and LCM of 12, 30, & 45
Scientific notation:				Additional skill	
Read and express numbers in both standard and scientific notation.	X	X	X	Additional sub-skill	**Anchor:** Write 32,500 and .00357 in scientific notation. Write 4.56×10^5 and 3.44×10^{-5}
I1.5 Calculate with numbers expressed in scientific notation.		X	X	Adapted	**Essential:** Compute using scientific notation. $(1.5 \times 10^5)(2.1 \times 10^{-3})$ and $(1.44 \times 10^4) / (1.2 \times 10^8)$ **Gateway:** Compute using scientific notation. $(1.98 \times 10^3) + (2.4 \times 10^2)$ and $(3.2 \times 10^{-2}) - (8.2 \times 10^{-1})$

KYAE Content Standards Work Groups [English (Writing), Reading, and Mathematics]

R/W	ADP Benchmark or Adapted Benchmark/Source	Anchor	Essential	Gateway	Other Benchmark	EXAMPLE
	I2. Recognize and apply magnitude (absolute value) and ordering of real numbers:					
	I2.1 Locate the position of a number on the number line, know that its distance from the origin is its absolute value and know that the distance between two numbers on the number line is the absolute value of their distance.	X	X	X		**Anchor:** Evaluate $\lvert -4.5 \rvert$ **Essential:** Fine the distance between –7.5 and 12.2 **Gateway:** Find the approximate distance between –53 and 7 3/4
	I2.2 Determine the relative position on the number line of numbers and the relative magnitude of numbers expressed in fractional form, in decimal form, as roots or in scientific notation.	X (Estimate Roots)	X	X		**Anchor:** Determine which of the two fractions -3/5 and -4/7 is larger and which has greater magnitude without using a calculator. **Essential:** Order the following numbers from least to greatest without using a calculator: $\sqrt{12}, 3, \sqrt[3]{18}, 2, \sqrt{15}, 4$. **Essential:** Approximate how much larger 6×10^{4} is than 3×10^{-5} and check that approximation by dividing 6×10^{4} by 3×10^{-5} to obtain $(6\times10^{4})\div(3\times10^{-5}) = 2\times10^{9}$ to see that 6×10^{4} is two billion times as large as 3×10^{-5}.
	I3. Understand that to solve certain problems and equations, number systems need to be extended from whole numbers to the set of all integers (positive, negative and zero), from integers to rational numbers, from rational numbers to real numbers (rational and irrational numbers) and from real numbers to complex numbers; define and give examples of each of these types of numbers.	X (Rational)	X (Real)	X (Complex)		Negative integers are required to measure quantities such as temperatures below zero; rational numbers are required to measure quantities that are not integers such as the length of each piece of a 5-foot wire cut into two equal pieces; irrational numbers are required to measure quantities such as the length of the diagonal of a unit square and complex numbers are required to solve equations such as $x^{2}+1=0$.

KYAE Content Standards Work Groups [English (Writing), Reading, and Mathematics]

R/W	ADP Benchmark or Adapted Benchmark/Source	Anchor	Essential	Gateway	Other Benchmark	EXAMPLE
	I4. Understand the capabilities and limitations of calculators and computers in solving problems:					
	I4.1 Use calculators appropriately and make estimations without a calculator regularly to detect potential errors.	X	X	X		Self-explanatory.
	I4.2 Use graphing calculators and computer spreadsheets	X (Spreadsheets)	X	X		Self-explanatory.
	J. Algebra					
	J1. Perform basic operations on algebraic expressions:				Adapted	
	J1.1 Understand the properties of integer exponents and roots and apply these properties to simplify algebraic expressions.	X (Whole # Exponent)	X	X		**Essential:** Simplify the expression $\left(\frac{a}{b}\right)^m \cdot c^{2m}$ to obtain either $\frac{(ac^2)^m}{b^m}$ or $\left(\frac{ac^2}{b}\right)^m$.
	J1.2 Understand the properties of rational exponents and apply these properties to simplify algebraic expressions.		X (Understand)	X		**Essential:** $\sqrt[3]{x^2} = x^{\frac{2}{3}}$ **Gateway:** Explain why $\sqrt[3]{x^2} \cdot \sqrt{x} = x^{\frac{2}{3}} \cdot x^{\frac{1}{2}} = x^{\frac{7}{6}} = \sqrt[6]{x^7} = x\sqrt[6]{x}$ for any nonnegative number x.
	J1.3 Add, subtract and multiply polynomials; divide a polynomial by a low-degree polynomial.	X (+/-/x)	X	X		**Anchor:** $(7x^2 - 3x + 4) - (9x^2 - 3x - 2)$ to obtain $-2x^2 + 6$ **Essential:** Divide $x^3 - 8$ by $x - 2$ to obtain $x^2 + 2x + 4$; divide $x^4 - 5x^3 - 2x$ by x^2 to obtain $x^2 - 5x - \frac{2}{x}$. **Gateway:** Divide $x^3 - x^2 + x - 2$ by $x^2 + 1$ to obtain $x - 1 + \frac{-1}{x^2+1}$ and understand that also means that $(x^2 + 1)(x - 1) - 1 = x^3 - x^2 + x - 2.$

KYAE Content Standards Work Groups [English (Writing), Reading, and Mathematics]

R/W	ADP Benchmark or Adapted Benchmark/Source	Anchor	Essential	Gateway	Other Benchmark	EXAMPLE
J1.4 Factor polynomials by removing the greatest common factor; factor quadratic polynomials.		X (Greatest Common Factor)	X	X		**Anchor:** Remove the greatest common factor $3x^3y$ from $12x^3y^2 + 9x^4y + 6x^5y^3$ to obtain the factorization $3x^3y(4y + 3x + 2x^2y^2)$. **Essential:** Factor $x^2 - 36$, $4x^2 + 12xy + 9y^2$, and $x^2 - 5x - 6$ to obtain $(x + 6)(x - 6)$, $(2x + 3y)^2$, and $(x - 6)(x + 1)$ respectively.
J1.5 Add, subtract, multiply, divide and simplify rational expressions.			X	X	Kentucky Core Content	**Essential:** Express $\frac{1}{x} + \frac{1}{y}$ as a single fraction to obtain $\frac{x+y}{xy}$. **Essential:** Simplify $\frac{a^2 - b^2}{2b^3} \cdot \frac{6ab}{a+b}$ to obtain $\frac{3a(a-b)}{b^2}$.
J1.6 Evaluate polynomial and rational expressions and expressions containing radicals and absolute values at specified values of their variables.		X (Integer Evaluation)	X (Rational Evaluation)	X		**Anchor:** Evaluate (x – 1)/(x + 1), when x = -3. **Essential:** Evaluate [2(x^2 + y)]/z, when x = -1, y = -9, and z = -1.
J1.7 Use the formulas for the general term and summation of finite arithmetic and geometric series.				X	Adapted	**Gateway:** Derive the formula for the sum S of the first N terms of a geometric series whose first term is 1 and common ratio is r to obtain $S = 1 + r + r^2 + r^3 + ... + r^{N-1} = \frac{1 - r^N}{1 - r}$. Determine the 126th term of the arithmetic sequence whose third term is 5 and seventh term is 29.
J2. Understand functions, their representations and their properties:						

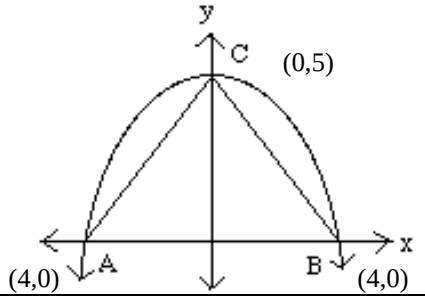
KYAE Content Standards Work Groups [English (Writing), Reading, and Mathematics]

R/W	ADP Benchmark or Adapted Benchmark/Source	Anchor	Essential	Gateway	Other Benchmark	EXAMPLE
	J2.1 Recognize whether a relationship given in symbolic or graphical form is a function.	X (Linear/Graph)	X	X		Self-explanatory.
	J2.2 Determine the domain of a function represented in either symbolic or graphical form.		X	X		**Essential:** Determine that the domain of the function $f(x)=\sqrt{x-2}$ can be written in interval form as $[2,\infty)$ and that the domain of the function $g(x)=\frac{1}{x^2-9}$ contains all real numbers except 3 and -3.
	J2.3 Understand functional notation and evaluate a function at a specified point in its domain.		X	X		**Essential:** Find f(-2) for $f(x) = -28x^2-7x+21$.
	J3. Apply basic algebraic expressions to solve equations and inequalities:					
	J3.1 Solve linear equations and inequalities in one variable including those involving the absolute value of a linear function.	X (Equality & Inequality)	X	X		**Anchor:** The length L of a spring in centimeters is given by $L=\frac{4}{7}F+9$, where F is the applied force in dynes. What force F will produce a spring length of 14 centimeters? **Essential:** A pipe is to be cut to a length of 5 meters accurate to within a tenth of a centimeter. Recognize that an acceptable length x (in meters) of the pipe satisfies the inequality $\lvert x-5\rvert \le 0.001$.

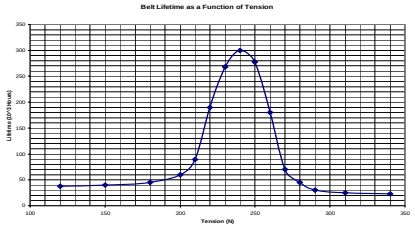
KYAE Content Standards Work Groups [English (Writing), Reading, and Mathematics]

R/W	ADP Benchmark or Adapted Benchmark/Source	Anchor	Essential	Gateway	Other Benchmark	EXAMPLE
	J3.2 Solve an equation involving several variables for one variable in terms of the others.	X	X	X		**Anchor:** If C represents the temperature in degrees Celsius and F represents the temperature in degrees Fahrenheit, then $C = \frac{5}{9}(F - 32)$. Evaluate if F = 50. **Essential:** If C represents the temperature in degrees Celsius and F represents the temperature in degrees Fahrenheit, then $C = \frac{5}{9}(F - 32)$. Solve this equation for F to obtain $F = \frac{9}{5}C + 32$. **Gateway:** Newton's Law of Gravitation says that the force F exerted by a body of mass m on a body of mass M is $F = \frac{GmM}{r^2}$, where G is the gravitational constant and r is the distance between the bodies. Solve this equation for r to obtain $r = \sqrt{\frac{GmM}{F}}$.
	J3.3 Solve systems of two linear equations in two variables.		X	X		**Essential:** Solve for x and y using substitution or addition methods 5x + 7y = 14 3x – 4y = -8
	J3.5 Solve quadratic equations in one variable.		X	X		**Essential:** Solve $x^2 - x - 6 = 0$ by recognizing that $x^2 - x - 6 = (x - 3)(x + 2)$ can be factored to obtain the two solutions $x = 3$ and $x = -2$. **Gateway:** Solve $x^2 + 4x + 2 = 0$ by using the quadratic formula or by completing the square.

KYAE Content Standards Work Groups [English (Writing), Reading, and Mathematics]

R/W	ADP Benchmark or Adapted Benchmark/Source	Anchor	Essential	Gateway	Other Benchmark	EXAMPLE
	J4. Graph a variety of equations and inequalities in two variables, demonstrate understanding of the relationships between the algebraic properties of an equation and the geometric properties of its graph, and interpret a graph:					
	J4.1 Graph a linear equation and demonstrate that it has a constant rate of change.	X (Slope is an Integer)	X (Slope is Rational)	X (Slope is Rational)		**Anchor:** Graph y = 3x + 8 **Essential:** Graph y = (2/5)x – 4
	J4.2 Understand the relationship between the coefficients of a linear equation and the slope and x- and y-intercepts of its graph.		X	X		**Essential:** Given 2x – 3y = 6, find the slope and x and y intercepts.
	J4.3 Understand the relationship between a solution of a system of two linear equations in two variables and the graphs of the corresponding lines.		X	X		Break-even cost/income analysis.
	J4.4 Graph the solution set of a linear inequality and identify whether the solution set is an open or a closed half-plane; graph the solution set of a system of two or three linear inequalities.			X		**Gateway:** Graph the solution set of the system of linear inequalities: $2x + y \le 4$ $x \ge 1.$
	J4.5 Graph a quadratic function and understand the relationship between its real zeros and the x-intercepts of its graph.		X (Understand)	X		**Gateway:** The parabola shown below has equation $y = -x^2 + 2$ and passes through the points A, B and C. What is the area of the triangle ABC, rounded to two decimal places? 

KYAE Content Standards Work Groups [English (Writing), Reading, and Mathematics]

R/W	ADP Benchmark or Adapted Benchmark/Source	Anchor	Essential	Gateway	Other Benchmark	EXAMPLE
	J4.7 Graph exponential functions and identify their key characteristics.			X		**Gateway:** Graph the exponential function $y(x)=2^x$. Recognize that y(x+1) is twice as large as y(x) since $y(x+1)=2^{x+1}=2\cdot 2^x=2\cdot y(x)$. How much money must be invested at 6% annual interest if you want to have $40,000 in 20 years?
	J4.8 Read information and draw conclusions from graphs; identify properties of a graph that provide useful information about the original problem.	X	X	X		Self-explanatory. This is a progressively developed skill based on reading level. **Anchor/Essential:** The lifetime of the timing belt in your car depends on the tensioning of the belt. The manufacturer specifies 240 N as the proper tension but the mechanic working on your car can be off by as much as 10%. Use the following graph to estimate the reduction in the life of the belt that can occur with this error in tensioning. 
	J5. Solve problems by converting the verbal information given into an appropriate mathematical model involving equations or systems of equations; apply appropriate mathematical techniques to analyze these mathematical models; and interpret the solution obtained in written form using appropriate units of measurement:					

KYAE Content Standards Work Groups [English (Writing), Reading, and Mathematics]

R/W	ADP Benchmark or Adapted Benchmark/Source	Anchor	Essential	Gateway	Other Benchmark	EXAMPLE
J5.1 Recognize and solve problems that can be modeled using a linear equation in one variable, such as time/rate/distance problems, percent-age increase or decrease problems, and ratio and proportion problems.		X	X	X		**Anchor:** If 8 pens cost $10, how much will 20 pens cost? **Essential:** Mrs. Moore invested $8,000. Part of the money gained 7% while the rest lost 5%. If the total lost was $100, how much was invested at each rate?
J5.2 Recognize and solve problems that can be modeled using a system of two equations in two variables, such as mixture problems.			X	X		**Essential:** A chemist has available two solutions of acid. The first solution contains 12% acid and the second solution contains 20% acid. He wants to mix the two solutions to obtain a 500-milliliter mixture containing 15% acid. How many milliliters of each solution should he mix?
J5.3 Recognize and solve problems that can be modeled using a quadratic equation, such as the motion of an object under the force of gravity.				X		**Gateway:** A stone is dropped off a cliff 660 feet above ground. When will the stone hit the ground if its height in feet at time t seconds after it is dropped is given by $h(t) = 660 - 16 \cdot t^2$.
J5.4 Recognize and solve problems that can be modeled using an exponential function, such as compound interest problems.				X		Self-explanatory.
J5.5 Recognize and solve problems that can be modeled using an exponential function but whose solution requires facility with logarithms, such as exponential growth and decay problems.				X (Recognize)		**Gateway:** How long will it take the balance in your savings account to double if you earn 1.5% compounded annually?
J5.6 Recognize and solve problems that can be modeled using a finite geometric series, such as home mortgage problems and other compound interest problems.				X (Recognize)		**Gateway:** How much money will you have in a retirement fund if you deposit $1000 each year for 20 years and the interest rate remains constant at 4%?

KYAE Content Standards Work Groups [English (Writing), Reading, and Mathematics]

R/W	ADP Benchmark or Adapted Benchmark/Source	Anchor	Essential	Gateway	Other Benchmark	EXAMPLE
K. Geometry						
K1. Understand the different roles played by axioms, definitions and theorems in the logical structure of mathematics, especially in geometry:						
K1.1 State how a definition, an axiom and a theorem are different.		X	X	X	Adapted	Self-explanatory.
K1.2 State and prove key basic theorems in geometry such as the Pythagorean theorem, the sum of the angles of a triangle is 180 degrees, and the line joining the midpoints of two sides of a triangle is parallel to the third side and half its length.		X (State)	X (Informal Proof)	X (Informal Proof)		**Anchor:** $a^2 + b^2 = c^2$ $m<1 + m<2 + m<3 = 180°$
K2. Identify and apply the definitions related to lines and angles (adjacent, complementary, supplementary, vertical) in (Euclidean) geometry and solve problems:					Adapted	Self explanatory.
K2.1 Identify and apply properties of parallel lines		X	X	X	Adapted	**Anchor**: Drawing of parallel lines cut by a transversal with one exterior angle labeled 150°. Ask for the measure of the alternate exterior angle of the adjacent exterior angle. **Essential**: Drawing of two parallel lines cut by two intersecting transversals, given the measure of one alternate interior angle formed by the intersection of the transversals, find the measure of the remaining six angles.
K2.2 Identify and apply properties of perpendicular lines		X	X	X	Adapted	**Anchor**: Given the measure of one angle of two complementary angles, find the measure of the other angle.
K2.3 Identify and apply properties of angles *in problem solving situations*		X	X	X	Adapted	**Anchor**: Given the measure of one angle of two supplementary angles, find the measure of the other angle. **Essential**: Two angles are complementary. One is twenty degrees less than four times as large as the other. Find the measure of each angle.

KYAE Content Standards Work Groups [English (Writing), Reading, and Mathematics]

R/W	ADP Benchmark or Adapted Benchmark/Source	Anchor	Essential	Gateway	Other Benchmark	EXAMPLE
	K3. Know the basic theorems about congruent and similar triangles and use them to solve problems.	X	X	X	Adapted	**Anchor:** When you set a projector 12 feet from the screen, the image on the screen measures 8 feet across. What will the width of the image be if you move the projector 3 feet further from the screen?
	K4. Know the definitions and basic properties of a circle and use them to solve problems.	X	X	X	Adapted	**Essential:** A tangent to a circle is perpendicular to the line segment from the center of the circle to the point of tangency.
	K5. Apply the Pythagorean Theorem, its converse and properties of special right triangles to solve problems.	X (Use Pythagorean Theorem)	X	X		**Anchor:** Given the lengths of two sides of a right triangle, find the length of the third side. **Essential:** Given a triangle with sides of length 12 and 13 inches, identify the triangle as acute, right, obtuse, or not a triangle at all for various lengths of the third side such as 4, 5, 6,18, or 26 inches. Justify your answer. **Gateway:** Determine the lengths of the sides of the special right triangle with angles 30, 60, and 90 degrees and the special right triangle with angles 45, 45 and 90 degrees if the length of the smallest side in each case is 1 meter.
	K6. Define and recognize reflections, translations and rotations in creating and analyzing geometric designs.	X (Informal)	X	X	Adapted	**Essential:** Prove the side-angle-side criterion for showing that two triangles are congruent. **Gateway:** Analyze tessellations of the plane.
	K7. Know about the similarity of figures and use the scale factor to solve problems.	X	X	X		**Anchor:** Read and extract information from scale drawings; compute lengths and areas from scale drawings.
	K8. Know that geometric measurements (length, area, perimeter, volume) depend on the choice of a unit and that measurements made on physical objects are approximations; calculate the measurements of common plane and solid geometric figures:					

KYAE Content Standards Work Groups [English (Writing), Reading, and Mathematics]

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K8.1 Understand that numerical values associated with measurements of physical quantities must be assigned units of measurement or dimensions; apply such units correctly in expressions, equations and problem solutions that involve measurements; and convert a measurement using one unit of measurement to another unit of measurement.		X	X	X		**Anchor:** Convert feet per second to miles per hour and use dimensional analysis to verify that the calculation yields the appropriate measurement unit: $1\frac{ft}{\sec} = 1\frac{ft}{\sec} \times 3600\frac{\sec}{hr} \times \frac{1}{5280}\frac{mi}{ft} = \frac{30}{44}\frac{mi}{hr}$. **Anchor/Essential:** Confirm that the distance traveled in 45 minutes at the rate of 2.4 meters per second is 6.48 kilometers. $d = rt = 2.4\frac{m}{\sec} \times \frac{1}{1000}\frac{km}{m} \times 45\min \times 60\frac{\sec}{\min} = 6.48km$. **Essential:** Convert speed of 150 meters per second to miles per hour. $150\frac{m}{\sec} = 150\frac{m}{\sec} \times 3600\frac{\sec}{hr} \times \frac{1}{1610}\frac{mi}{m} \approx 335\frac{mi}{hr}$
K8.2 Determine the perimeter of a polygon and the circumference of a circle; the area of a rectangle, a circle, a triangle and a polygon with more than four sides by decomposing it into triangles; the surface area of a prism, a pyramid, a cone and a sphere; and the volume of a rectangular box, a prism, a pyramid, a cone and a sphere.	X (Perimeter/ Area Polygon & Circle, Surface Area & Volume of Rectangular Box)	X	X			**Essential:** How much material is removed when you drill a hole with diameter 2 cm through a block of metal that is 3 cm thick?

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	K8.3 Know that the effect of a scale factor *k* on length, area and volume is to multiply each by k, k^2, and k^3, respectively.	X (Length)	X	X		**Anchor:** Know that a 16" (diameter) pizza has four times as much pizza as an 8" (diameter) pizza.
	K9. Visualize solids and surfaces in three-dimensional space when given two-dimensional representations (e.g., nets, multiple views) and create two-dimensional representations for the surfaces of three-dimensional objects.	X (Visualize)	X	X		Self-explanatory.
	K10. Represent geometric objects and figures algebraically using coordinates; use algebra to solve geometric problems:					
	K10.1 Express the intuitive concept of the "slant" of a line in terms of the precise concept of slope, use the coordinates of two points on a line to define its slope, and use slope to express the parallelism and perpendicularity of lines.	X (Slope Concept)	X	X		**Anchor**: Given the points (2,3) and (4, -5), determine the slope of the line. **Essential**: Using slope, decide whether x – y = 1 and x + y = 5 are parallel or perpendicular. Decide whether x + 2y = 4 and 2x + 4y = -4 are parallel or perpendicular.
	K10.2 Describe a line by a linear equation.	X	X	X		**Essential:** Find an equation for the line containing the points (32,0) and (212,100). If the first coordinate of a point on this line is 98.6, what is the second coordinate? Identify the point on this line where the two coordinates are the same?
	K10.3 Find the distance between two points using their coordinates and the Pythagorean theorem.	X	X	X		**Anchor**: Find the distance between the points (1,5) and (-3, 4).

KYAE Content Standards Work Groups [English (Writing), Reading, and Mathematics]

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	K10.4 Find an equation of a circle given its center and radius and, given an equation of a circle, find its center and radius.			X		**Gateway:** The circle with radius 5 and center at (1,0) has equation $(x-1)^2 + y^2 = 25.$ Transform the quadratic equation $x^2 + 2x + y^2 - 4y = 4$ Into the form $(x+1)^2 + (y-2)^2 = 9$ by completing the square; realize that the graph of the equation is a circle with center at $(-1,2)$ and with radius 3.
	K11. Understand basic right-triangle trigonometry and apply it to solve problems:					
	K11.1 Understand how similarity of right triangles allows the trigonometric functions sine, cosine and tangent to be defined as ratios of sides and be able to use these functions to solve problems.		X	X		Self-explanatory.
	K11.2 Apply the trigonometric functions sine, cosine and tangent to solve for an unknown length of a side of a right triangle, given one of the acute angles and the length of another side.			X		**Gateway:** Safety regulations require that the angle between a ladder and the wall should be between 25 and 30 degrees. What is the range of safe placements (distance from the wall) for the bottom of a 12 foot ladder? Where should the base of a 20 foot ladder be placed to satisfy the same safety regulation?
	L. Data Interpretation, Statistics and Probability					
	L1. Explain and apply quantitative information:					
	L1.1 Organize and display data using appropriate methods (including spreadsheets) to detect patterns and departures from patterns.	X	X	X		**Anchor:** Data is provided to the student and the student is asked to organize and display the data.
	L1.2 Read and interpret tables, charts and graphs.	X	X	X		Self-explanatory.

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	L1.3 Use summary statistics for distributions of data including measures of center (mean, median) and spread and shape (range, percentiles, variance, standard deviation).	X	X	X		**Anchor**: Given the following temperatures: 61.5°F 64.8°F 69.0°F 67.3°F 65.6°F 60.8°F 61.1°F 65.4°F Find the mean and median temperatures to the nearest tenth of a degree and the range of the data.
	L1.4 Compare data sets using graphs and summary statistics.	X	X	X		Self-explanatory. This is a progressively developed skill. **Anchorl:** Given data, create a comparison bar chart of a school's test scores for 1995 and for 2000 and ask what changes occurred in the five years. **Essential:** Given data, create a box plot of a school's test scores for 1995 and for 2000 and ask what changes occurred in the five years.
	L1.5 Create scatter plots, analyze patterns and describe relationships in paired data.	X	X	X		Self-explanatory. This is a progressively developed skill. **Anchor:** Data is provided.
	L2. Explain and critique alternative ways of presenting and using information:					
	L2.1 Evaluate reports based on data published in the media by considering the source of the data, the design of the study, and the way the data are analyzed and displayed.	X	X	X		Self-explanatory. This is a progressively developed skill based on reading level. **Anchor:** Data is provided (Sources such as *USA Today* and *Newsweek*).
	L2.2 Identify and explain misleading uses of data.	X	X	X		**Anchor:** Explain why the following graphic misrepresents the data it is intended to illustrate.

KYAE Content Standards Work Groups [English (Writing), Reading, and Mathematics]

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						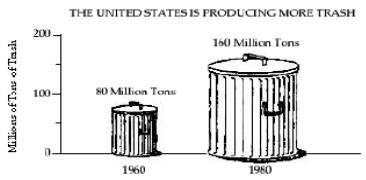
L2.3 Recognize when arguments based on data confuse correlation with causation.		X	X	X	Consider reasoning skills (math & communica-tion)	**Anchor:** Researchers have noticed that the number of golf courses and the number of divorces in the United States are strongly correlated and both have been increasing over the last several decades. Can you conclude that the increasing number of golf courses is causing the number of divorces to increase? Explain your answer.
L3. Explain the use of data and statistical thinking to draw inferences, make predictions and justify conclusions:						
L3.2 Design simple experiments or investigations to collect data to answer questions of interest.		X	X	X	Consider reasoning skills	Self-explanatory.
L3.3 Explain the differences between randomized experiments and observational studies.		X	X	X	Consider reasoning skills	Self-explanatory.
Organize, display, plot, and interpret statistical data (tables, graphs, scatterplots) of two-variable data.		X	X	X	Additional skill Revised from Kentucky Core Content	Self-explanatory. This is a progressively developed skill.

KYAE Content Standards Work Groups [English (Writing), Reading, and Mathematics]

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	L3.4 Construct a scatter plot of a set of paired data, and if it demonstrated a linear trend, use a graphing calculator to find the regression line that best fits this data; recognize that the squared correlation coefficient (r^2) measures goodness of fit and explain when it is appropriate to use the regression line to make predictions.	X	X	X		**Essential:** Given a table that gives the winning speeds (in miles per hour) at the Indianapolis 500 race for 20 years (Source: *The World Almanac*). Explain why it is not appropriate to use the linear regression equation for these data to estimate what the winning time was in 1920 or to predict the winning speed in 1990.
	L4. Apply probability concepts and calculate simple probabilities:				Adapted	
	L4.1 Determine the probability that an event occurs.	X	X	X	Adapted	This is a progressively developed skill (number sense).
	L4.2 Determine how the relative frequency of a specified outcome of an event is used to estimate the probability of the outcome.	X	X	X	Adapted	This is a progressively developed skill (number sense). **Anchor:** Typically, 35 out of every 100 teenagers in a certain community have received a traffic ticket. Of those teenagers who have received a ticket, 55% were charged with speeding. What is the probability that a teenager chosen at random will have received a speeding ticket?
	L4.3 Apply the law of large numbers to simple examples.	X	X	X	Adapted	This is a progressively developed skill (number sense). **Anchor:** Toss a fair coin 10 times, record the number of heads, and apply the data to estimate the probability of getting heads on a single toss of the coin. Toss the coin 20 more times, add the results to the previous data and apply the 30 tosses to estimate the probability of getting a heads. Toss the coin 30 more times and make another estimate of the probability of getting a heads. What can you observe about the probability as the number of tosses increases?

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	L4.4 Apply probability concepts such as conditional probability and independent events to calculate simple probabilities.	X (Independent)	X	X	Adapted	**Anchor:** A fair coin is tossed three times and three heads are obtained. Understand that the probability of obtaining a head on the fourth toss is 1/2 because this event is independent of outcomes of the three previous tosses. **Essential:** If two marbles are drawn randomly one after the other without replacement from a bag containing 4 red and 6 blue marbles, the probability that both marbles drawn are red is $\frac{4}{10} \cdot \frac{3}{9} = \frac{2}{15}$ because the probability of drawing a red marble on the second draw depends, or is conditional upon, the color of the first marble drawn.
	L4.5 Apply probability concepts to practical situations and make inferences.	X	X	X	Adapted	**Anchor:** A company has 6 telephone lines coming into its business. Efficiency experts performed a study for a week and determined that a given number of telephone lines were in use at any one time. Given a table determine the probability that at most four lines were in use at one time during the week.